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NASA Procedural Requirements

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Subject: Facilities Maintenance Management w/ Change 1 (4/21/04)

Responsible Office: Facilities Engineering and Real Property Division

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APPENDIX D. CMMS Sample Screens

1. Introduction

This appendix includes sample computer screens for various facilities maintenance functions that may be included in a Center's CMMS. These samples are from a commercially available system and are presented as a sample of some of the types of data handling capability available.

2. Operating Locations

The sample screens in Figures D-1 and D-2 are from an Operating Location application that allows the operator to enter and track locations of equipment and organize these locations into logical hierarchies or network systems. Operating locations are the locations in which equipment operates. Work orders can then be written either against the location itself or against the equipment in the operating location. Using locations allows for the tracking of the equipment's life-cycles (history) and provides the capability to track equipment's performance at specific sites.

3. Equipment

Figure D-3 is a sample screen from an equipment module that allows the operator to keep accurate and detailed records of each piece of equipment. Accurate historical data can be used to help make cost effective replace or repair decisions. All equipment related data is available, such as bill of material, preventive maintenance schedule, service contracts, safety procedures, measurement points, multiple meters, inspection routes, specification data (name plate), equipment downtime, and related documents. This equipment data is used for managing day-to-day operations. The data can be used to develop additional management information, such as building equipment downtime failure code hierarchies to use in maintenance management metrics.

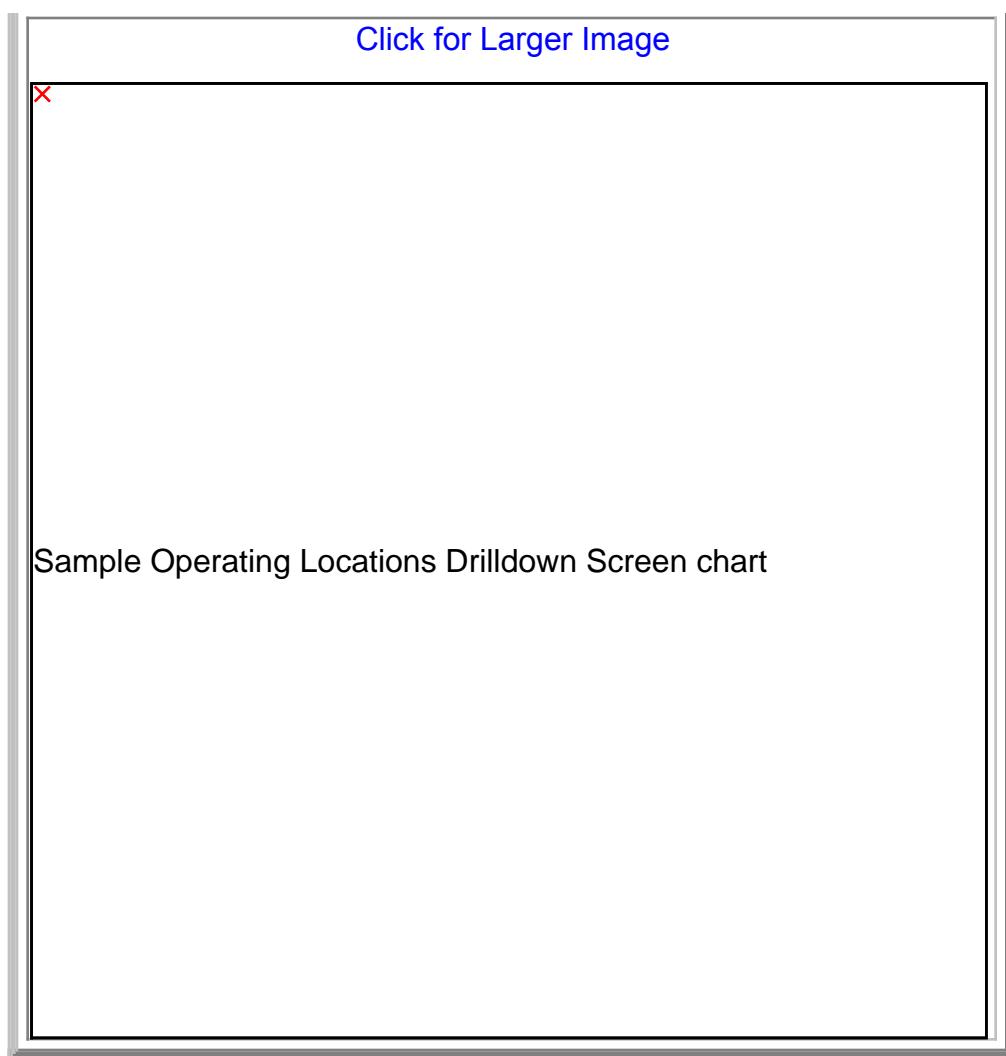


Figure D-1. Sample Operating Locations Drilldown Screen

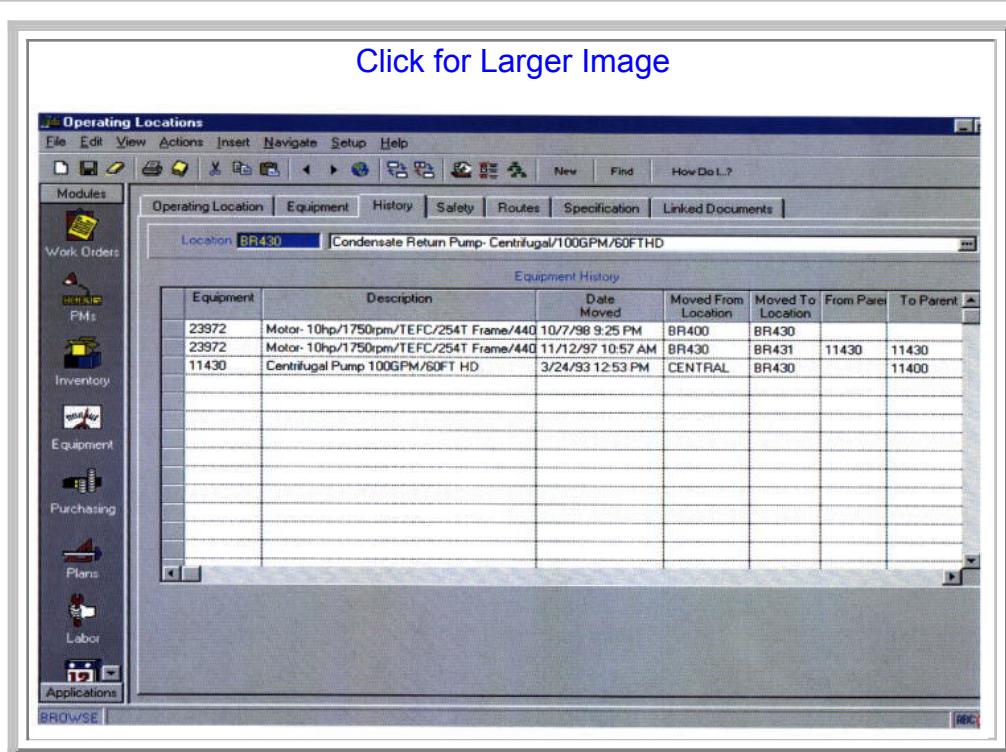
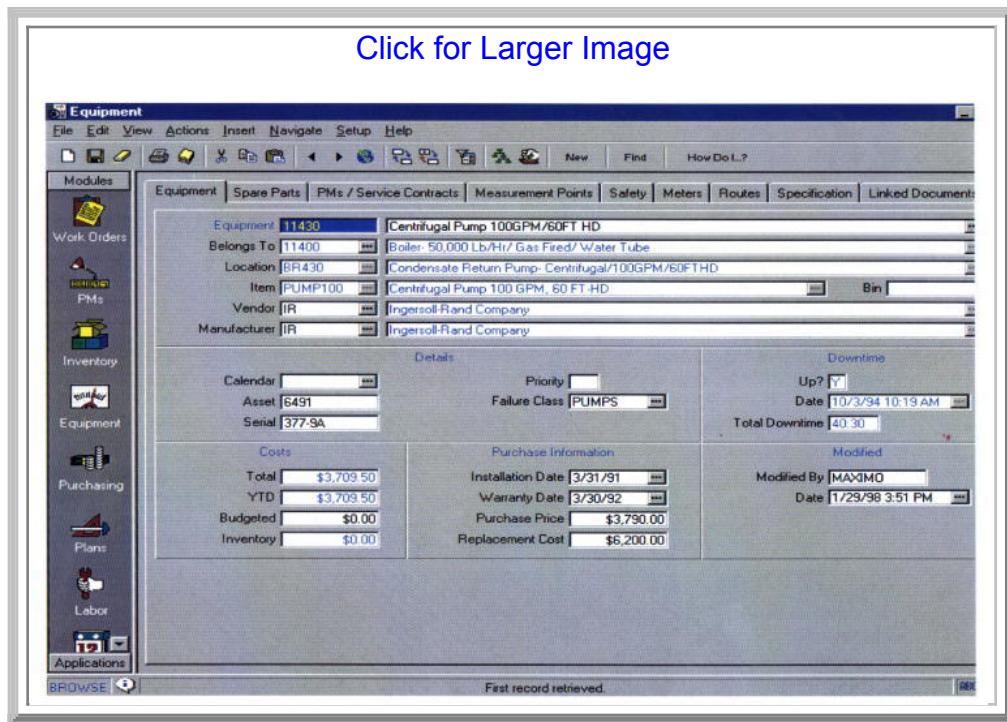
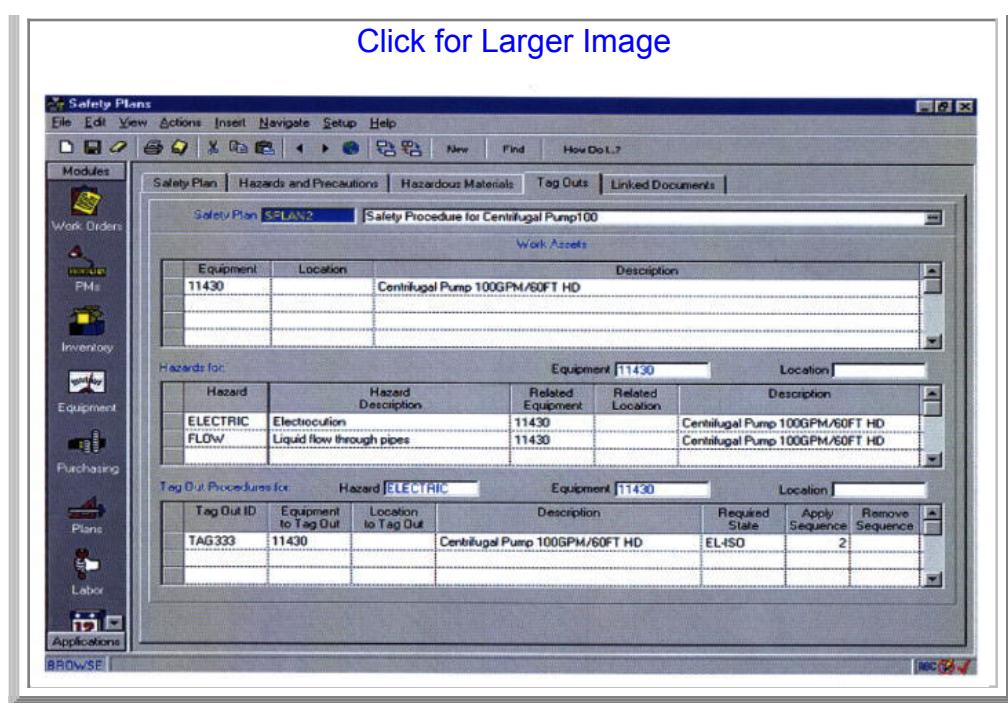


Figure D-2. Sample Operating Location Equipment History**Figure D-3. Sample Equipment Screen**

4. Safety Plans

Figure D-4 shows the tag out screen of the safety plan module of this example system. With the emphasis placed of safety in NASA this module or similar capability is an important addition to the CMMS. This sample module provides the following capabilities:

- Manual or automatic safety plan numbering.
- Safety plans can be built ad-hoc for special work or defined for re-use in the Safety Plans application.
- Track hazards for multiple equipment and locations.
- Multiple precautions can be associated to a hazard.
- Track hazardous materials for multiple equipment and locations.
- Once hazards and precautions are entered, convenient pop-up list in this sample system is available for reference and data entry.
- Track ratings for health, flammability, reactivity, contact, and MSDS for hazardous materials.
- Define lock-out/tag-out procedures.
- Define tag identifications for specific equipment and locations.
- Define safety plans for multiple equipment or locations.
- View link documents.
- Associate safety plans to job plans, to preventative maintenance masters and to work orders.
- Safety plans are printed automatically on work orders.
- Flexible business rules allows tag outs procedures to be associated to hazards OR directly to locations, equipment, safety plans or work orders.
- Copy existing safety plans to new safety plans.

**Figure D-4. Sample Safety Plans Screen**

5. Inventory Control

The Inventory Control application shown in Figures D-5 allows the operator to track inventory movement such as move items in or out of inventory, or from one location to another. Stocked, nonstocked, and special order items can be tracked. The application as shown in Figure D-5 also allows the tracking of item vendors, the locations where an item can be found, item cost information, and the substitute or alternate items that can be used if necessary.

6. Work Request

Figure D-6 is a sample work request screen that could be used by anyone at a Center to input-request, such as trouble calls, or by work control to record-request. The simple to use data entry screen was designed for minimal data entry. The work order number is assigned manually or automatically. A requester would enter minimal data, as shown on the sample, with work control entering additional information as required. Data is entered once, and pop-up tables in this system eliminate the need to memorize codes. This computer system could be used by a Center in their CMMS rather than the Trouble Call Ticket shown in Appendix C.

7. Work Order Tracking

The Sample Work Order Tracking Screen shown in Figure D-7 is the heart of a work order system. The data is entered once, and pop-up tables eliminate the need to memorize codes. This tracking system provides instant access to all of the information needed for detailed planning and scheduling, including work plan operations, labor, materials, tools, costs, equipment, blueprints, related documents, and failure analysis. Of course, this is dependent on how many modules have been installed and how much information has been entered in the system.

8. Work Management

- The Work Manager module in this example system lets the planner specify which labor to apply to specific work orders and when. It has two modes, Dispatching and Planning.
- In the Planning Mode shown in Figure D-8, labor assignments are planned for future shifts. Each person's calendar availability is considered when the assignments are made. The assignments are created sequentially over the shift, filling each person's daily schedule with priority work for the craft. It can even split larger jobs over multiple shifts - automatically.
- In the Dispatch Mode shown in Figure D-9 labor assignments are carried out as soon as possible. This system in this example can even begin tracking labor time from the instant the assignment is made. The system operator can interrupt work already in progress in order to reassign labor resources to more crucial work.

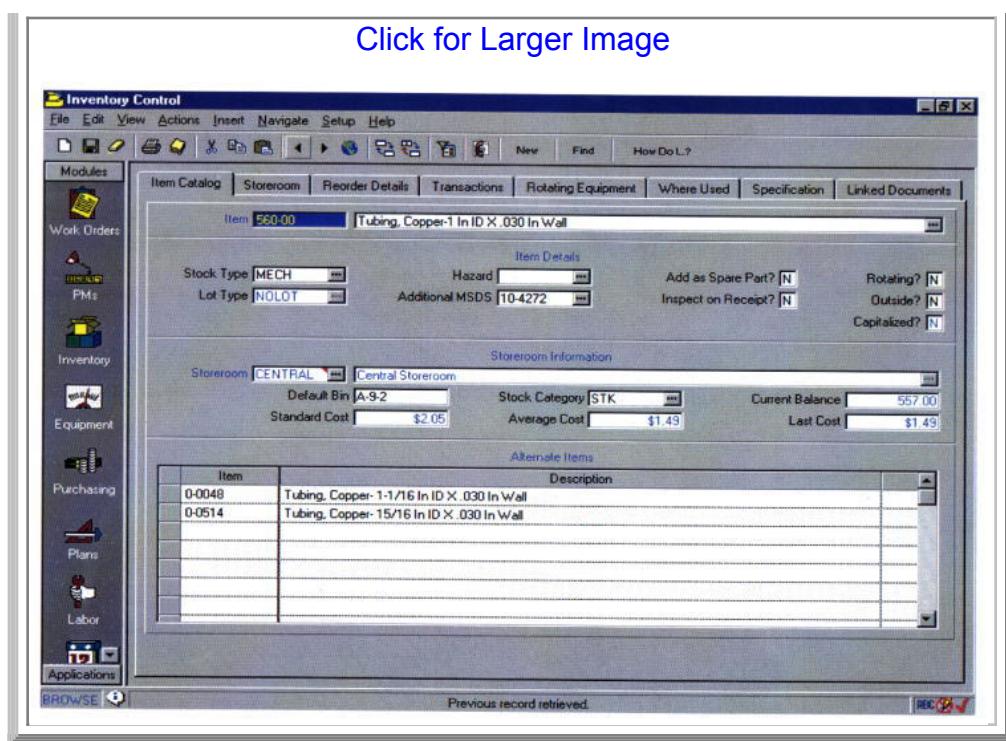


Figure D-5. Sample Inventory Control Screen

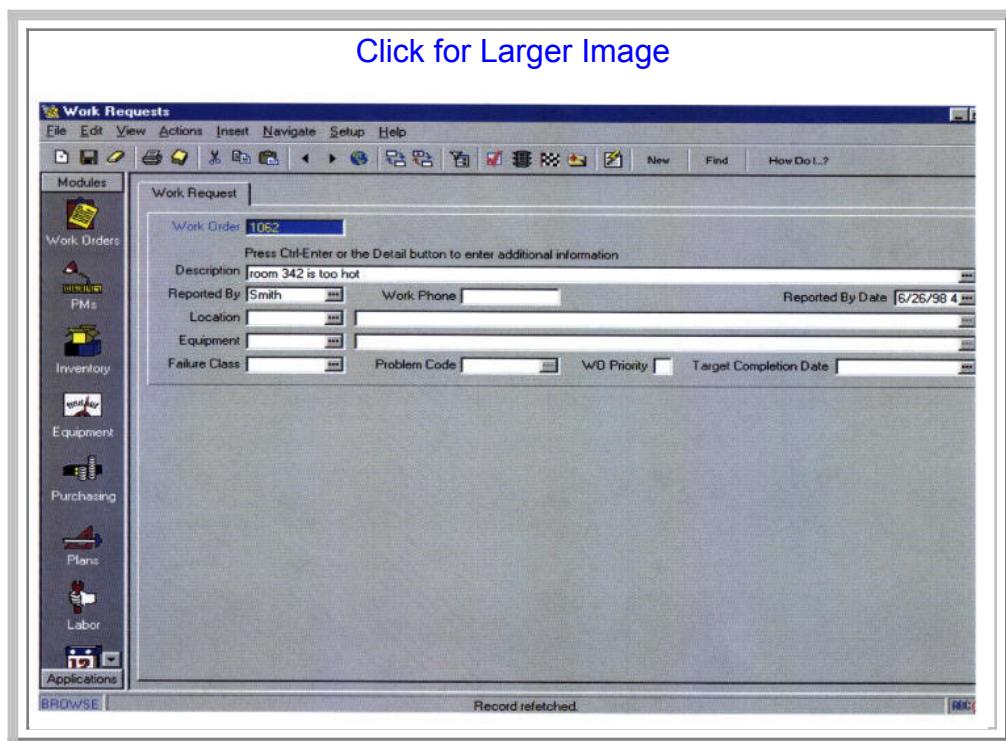


Figure D-6. Sample Work Request Screen

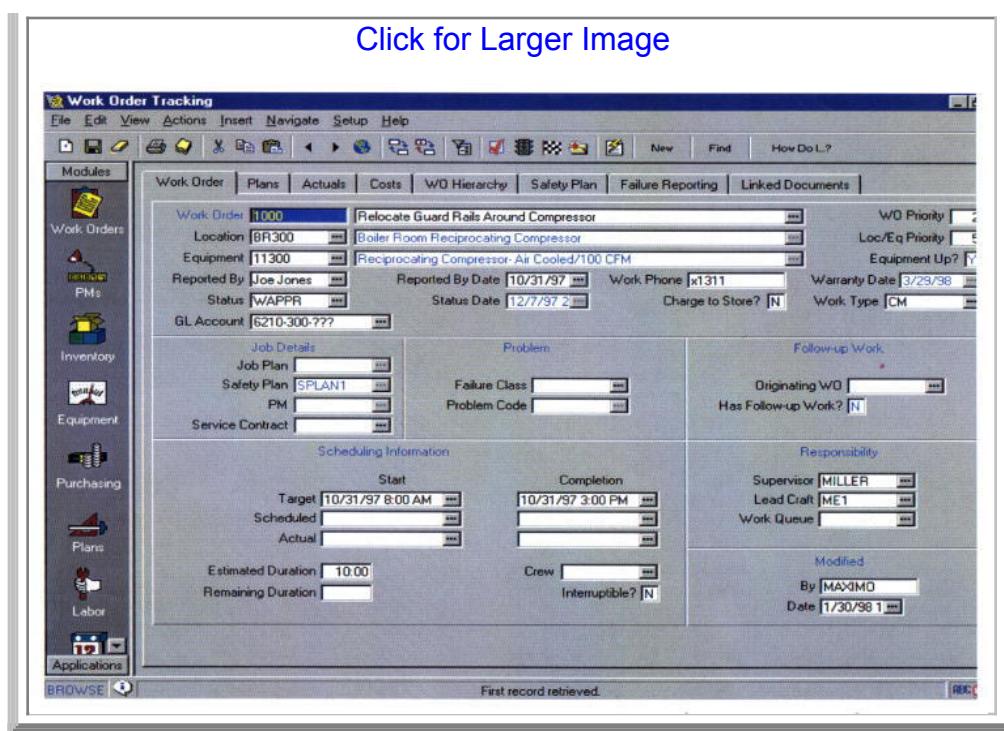


Figure D-7. Sample Work Order Tracking Screen

Work Order / Labor List								
Work Order	WO Description	Craft	Scheduled Date	Required Hours	Equipment	Location Group	Location	Reported By
2007	Air Filter - Check-out	EL1	10/21/1998 7:00 AM	1:00	11200	BOILER	BR200	MAXIMO
2007	Air Filter - Check-out	ME1	10/21/1998 7:00 AM	2:00	11200	BOILER	BR200	MAXIMO
1003	Check for Plumbing Problem	ME1	10/16/1998 2:53 PM	5:00	11400	BOILER	BR400	Tom Diller
1018	Paint Guard Rail Around #1 Fan	MA1	10/21/1998 7:00 AM	2:00	11210	BOILER	BR210	MAXIMO
6012	Compressor Quarterly Inspection	EL1	10/21/1998 4:06 PM	1:30	11300	BOILER	BR300	MAXIMO
6012	Compressor Quarterly Inspection	ME1	10/21/1998 4:06 PM	1:30	11300	BOILER	BR300	MAXIMO
6013	Burner Quarterly Inspection and C	EL1	10/21/1998 4:36 PM	1:30	11460	BOILER	BR460	MAXIMO
6013	Burner Quarterly Inspection and C	ME1	10/21/1998 4:36 PM	1:30	11460	BOILER	BR460	MAXIMO
6011	HVAC Quarterly Inspections & Ce	EL1	10/21/1998 7:06 PM	1:30	11200	BOILER	BR200	MAXIMO
6011	HVAC Quarterly Inspections & Ce	ME1	10/21/1998 7:06 PM	1:30	11200	BOILER	BR200	MAXIMO
1000	Relocate Guard Rails Around Col	ME1	10/21/1998 9:00 AM	6:00	11300	BOILER	BR300	Joe Jones
1000	Relocate Guard Rails Around Col	EL1	10/21/1998 7:00 AM	7:00	11300	BOILER	BR300	Joe Jones
1000	Relocate Guard Rails Around Col	EL1	10/21/1998 7:00 AM	7:00	11300	BOILER	BR300	Joe Jones

Craft	Labor Code	Name	Available Hours	Required Hours	Work Order	Schedule Date	W/O Location	Call #
EL1	HORN	Christine Horn	7:00	1:00	2007	10/21/1998 7:00 AM	BR200	9253
EL1	LIBERI	Diane Liberi	8:00					3476
EL1	PEDRICK	Mike Pedrick	8:00					5634
EL1	WILSON	Mike Wilson	8:00					7703
LU1	SCHAFFER	Leonard Schaffer	8:00					9253
MA1	MILLS	Keith Mills	6:00	2:00	1018	10/21/1998 7:00 AM	BR210	9253
MA2	PRESTON	Bill Preston	8:00					9253
MA3	WALL	Sandra Wall	8:00					9253
ME1	KLIEN	Ted Klien	0:00	2:00	2007	10/21/1998 7:00 AM	BR200	8349
ME1	KLIEN	Ted Klien	0:00	6:00	1000	10/21/1998 9:00 AM	BR300	8349

Figure D-8. Sample Planning Screen

9. Quick Reporting

Figure D-10 shows a sample Quick Reporting screen that provides a rapid and easy means for opening, reporting on, and closing work orders, reporting work on small jobs after-the-fact, and even creating work orders on-the-fly. Labor, materials, failure codes, completion date, and downtime can all be reported on this one screen.

10. Preventive Maintenance

Sample preventive maintenance screens are shown in Figures D-11 and 12. The following capabilities provided in this sample system are listed to show how a CMMS can be utilized in managing a Center's PM program:

- a. Supports multiple criteria for generating PM work orders. If a PM master has both time-based and meter-based frequency information the program uses whichever comes due first, and then updates the other.
- b. Generates time-based PM work orders based upon last generation or last completion date. Next due date and job plans are displayed.
- c. Permits and tracks PM extensions with adjustments to next due date.
- d. Triggers meter based PMs by two separate meters.
- e. Prints sequence Job Plans when wanted.
- f. Creates a PM against an item so new parts have PMs automatically generated on purchase.
- g. Specifies the number of days ahead to generate work orders from PM Masters that may not yet have met their frequency criteria.
- h. Consolidates weekly, monthly, and quarterly job plans on a single master.
- i. Assigns sequence numbers to job plans to tell the system which job plan to use when a PM work order is generated from a PM Master.
- j. Permits overriding frequency criteria in order to generate PM work orders whenever plant conditions require.
- k. Routes PMs with multiple equipment or locations.
- l. Generates work orders in batch or individually for only the equipment wanted.
- m. Can be used with the system Scheduler to forecast resources and budgets.

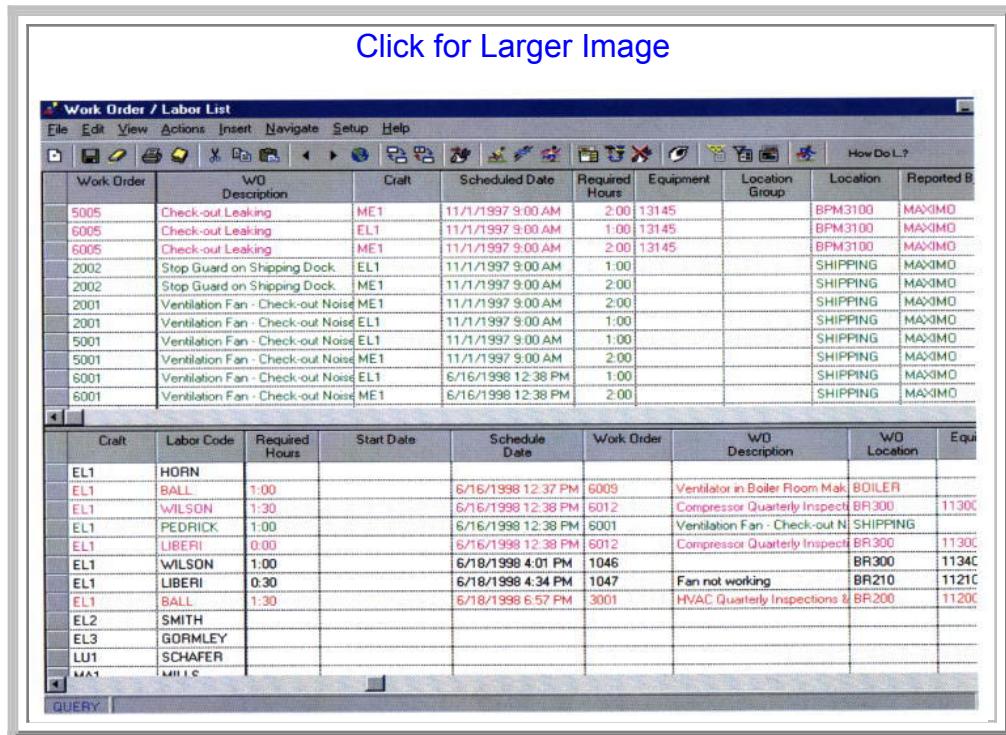


Figure D-9. Sample Dispatch Screen

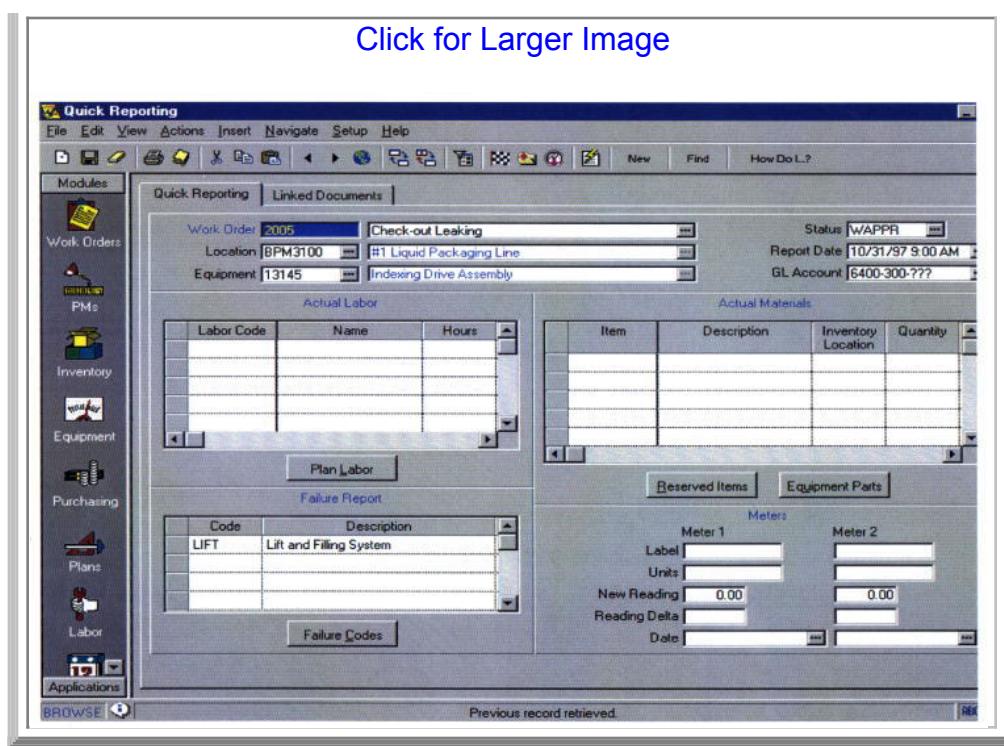


Figure D-10. Sample Quick Reporting Screen

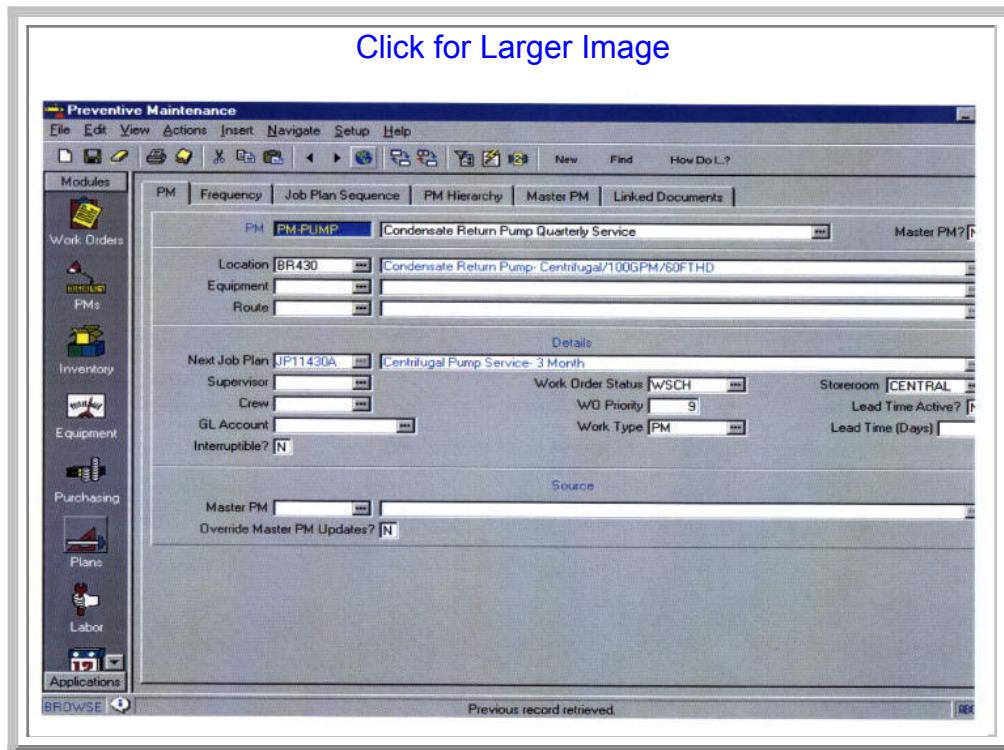


Figure D-11. Sample Preventive Maintenance Screen

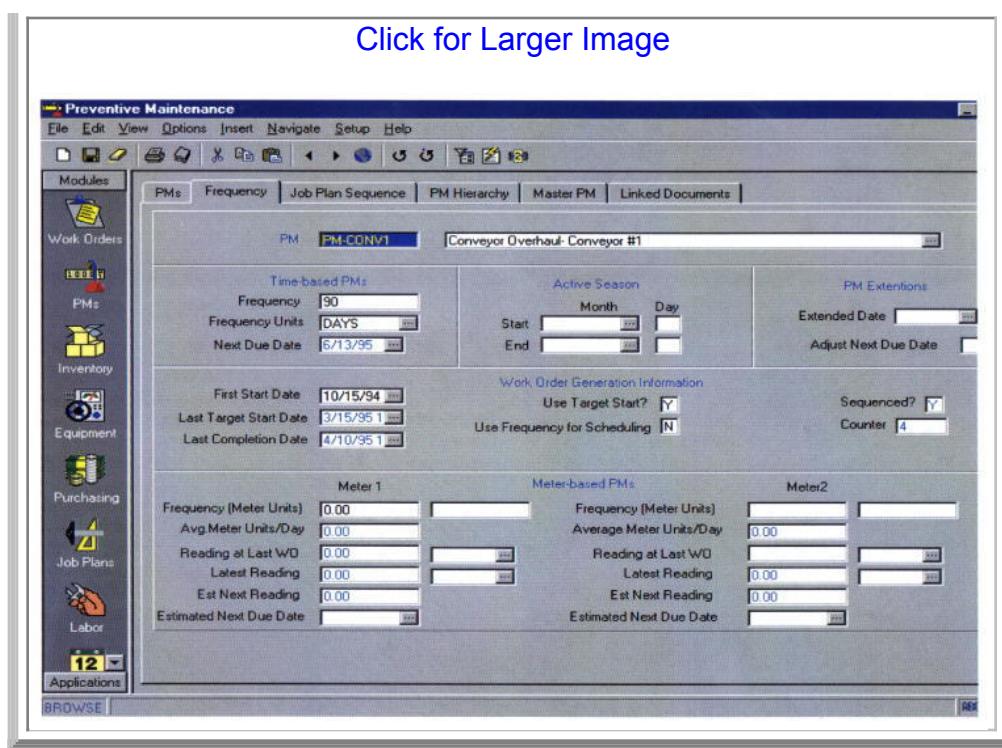


Figure D-12. Sample Preventive Maintenance Frequency Folder

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